Executive Summary

In year 2000, 16,377 cases of tuberculosis (TB) were reported in the United States. California contributed 3,297 cases, more than any other state. The national rate of tuberculosis was 5.8 cases per 100,000 population. Among all states, California's rate ranked third, at 9.5 cases per 100,000.

The number of TB cases, and the rate of tuberculosis in the population have continued to drop in California since the peak in 1992 (Table 1). During the eight year period between 1992 and 2000, the greatest decline in the number of cases and the rate was seen between 1999 and 2000. While this trend represents clear success in preventing, detecting and treating TB disease, there continue to be many key areas where expanded and improved efforts are needed as we move toward our goal of TB elimination.

Geographic Distribution of Cases

Although tuberculosis cases tend to be concentrated in the urban areas around Los Angeles and the San Francisco Bay Area, few jurisdictions have escaped TB entirely. Only two of California's 61 jurisdictions have not reported an active case of TB in the past decade. In 2000, 54 jurisdictions reported one case or more. Of these, 22 jurisdictions reported between one and four TB cases. As the overall number of TB cases declines, it will become increasingly difficult for jurisdictions with few cases to maintain the expertise and resources needed to adequately diagnose and treat cases of tuberculosis. The Institute of Medicine report, Ending Neglect: The Elimination of Tuberculosis in the United States, articulates the need for regionalization of TB services to address this issue. Toward this end, California is developing a plan to ensure that resources are available to maintain TB control in low morbidity jurisdictions (defined as averaging 30 or fewer TB cases per year over the previous 3 years). California's Tuberculosis Control Branch has also developed an Outbreak Response Plan which will help ensure that expertise and resources are available in the field when needed.

Demographics of TB Cases

Among race/ethnic groups in California, the greatest number of TB cases continues to occur in the Asian/Pacific Islander race/ethnic group, followed closely by Hispanics (Table 2). Asian/Pacific Islanders also exhibit the highest rate of TB (34.2 cases per 100,000 population), followed distantly by black, non-Hispanic (13.8), Hispanics (11.2), American Indian/Alaska Native (7.8), and white, non-Hispanic (2.2) (Table 3). Only the white, non-Hispanic group has met the national objective of 3.5 cases per 100,000 for year 2000.

The proportion of California's TB cases born outside the United States has continued to increase each year during the past decade. In 1991, 61% of

California's TB cases were foreign-born; in 2000, 72% were foreign-born (Table 2). The largest number of foreign-born TB cases is from Mexico, followed by the Philippines, Vietnam and the People's Republic of China (Table 10). The initiative developed by the Centers for Disease Control and Prevention (CDC) Division of Quarantine to establish electronic notification to states of immigrants and refugees arriving with suspected TB (B1/B2 status) is one approach that will enhance the opportunities for testing and treatment of persons with TB infection and disease, and ultimately serve to decrease the number of cases seen in this group.

Although the number of pediatric cases (ages 0-4 years) has declined, a substantial number continue to be reported in many jurisdictions of California (Table 16). These cases represent sentinel events that may indicate missed opportunities for early case detection and treatment. One of the measures of the Tuberculosis Indicator Project (TIP), California's newly implemented plan for the evaluation and improvement of TB programs in local jurisdictions, is the number of pediatric TB cases occurring in a jurisdiction. In follow-up to this measure of recent transmission, local jurisdictions can gain insight on why these cases occurred, and design interventions that will prevent the occurrence of pediatric cases in the future.

HIV/AIDS

Although the number of TB cases with a co-diagnosis of AIDS has decreased overall since 1994, the proportion of TB cases with AIDS has not steadily declined (Table 11). Following a gradual decrease since 1994, the percent of TB/AIDS cases rose slightly to 6.1% in 1999. Tuberculosis cases with AIDS, as a percent of all TB cases, have declined in all race/ethnic groups, but the decline was minimal for Hispanics. In fact, the percentage among Hispanics was stable from 1998 to 1999 (8.3% to 8.4%, respectively). An increasing proportion of California's TB/AIDS cases are now among the foreign-born; the proportion has risen from 38% in 1994 to 51% in 1999. The age of TB/AIDS cases has also increased over time. In 1994, 22% of TB/AIDS cases were age 45 or greater; in 1999, 33% of TB/AIDS cases were in this age group. This may reflect the delay in the onset of AIDS-defining illnesses with the use of newer treatments for HIV.

Persons with a co-diagnosis of HIV and TB present unique challenges for the effective treatment of both diseases. Knowledge of HIV status of TB patients is necessary for the appropriate management of tuberculosis cases co-infected with HIV. The changing profile of the TB/AIDS patient in California illustrates the need to offer HIV counseling and testing to TB suspects and cases.

Drug Resistance

The presence of isoniazid (INH) resistance has remained fairly constant between 1994 and 2000, with the proportion of INH resistance among cases ranging from 9.4% to 11.7% during that time period (Table 45). The recommendation for jurisdictions where INH resistance exceeds 4% is to start all TB cases on an initial regimen of four drugs. In 2000, 87% of California TB cases were started on a 4-drug regimen (Table 26).

Between 1994 and 2000, the level of multi-drug resistance tuberculosis (resistance to at least isoniazid and rifampin) has ranged between 1% and 2% of all cases (Table 46). During this seven year period, multi-drug resistant TB cases occurred in 34 local jurisdictions, including 15 jurisdictions averaging fewer than 20 total TB cases during those years, and 10 jurisdictions averaging between 20 and 65 total TB cases. Cases of multi-drug resistant TB are more difficult to treat, often requiring more expensive and more toxic drugs. These cases require an increased duration of treatment, and cases may remain infectious for longer periods of time. The widespread distribution of MDR-TB cases, and the unique treatment needs of these patients underscore the need for all TB programs to have access to expertise in containing this most deadly form of TB.

Deaths with TB

The death of a person with tuberculosis represents a sentinel event that may indicate a missed opportunity for the timely detection and treatment of disease, and the prevention of transmission of disease to others. In 2000, 55 cases were dead at the time the diagnosis of tuberculosis was made (Table 24). In 1998, 265 TB cases died during anti-tuberculosis treatment, while 13 were alive at diagnosis, but died before anti-tuberculosis treatment could be initiated (Table 25). While the absolute number of deaths has decreased from 581 to 364 between 1993 and 1998, the magnitude remains substantial (Figure 9). Deaths at any stage during the course of TB diagnosis and treatment should be further investigated to ascertain whether TB was a contributing cause of death, and if the death was potentially preventable.

Treatment Outcomes

The percentage of TB cases successfully completing treatment has continued to improve in California. For drug-susceptible cases reported in 1998, 73% completed therapy in 12 months or less. An additional 10% completed therapy in over 12 months (Table 48). For cases starting treatment in 1993, only 58% completed treatment in 12 months or less, while 19% completed in over 12 months. These improvements in treatment outcomes are accompanied by concomitant decreases in adverse treatment outcomes. In 1998, less than 7% of TB cases died during treatment, and less than 2% defaulted from treatment (lost

to follow-up, or refused treatment). For drug-susceptible cases reported in 1993, over 8% died during treatment, while nearly 5% defaulted. These improvements may be attributed in part to the increased use of directly observed therapy (DOT) in many jurisdictions in California. In 1998, 65% of cases received DOT for at least part of their treatment (Table 28); in 1994 only 38% received DOT. Analysis of the Adverse Treatment Outcomes study (ATO), a comprehensive field study of TB treatment, will improve our understanding of other factors that may contribute to the failure to complete TB treatment.

Continuity of Care for TB Patients

Tuberculosis patients who move before completing their entire course of anti-TB treatment are a group of concern (Table 47-51). A recently published study from the California Tuberculosis Control Branch (Cummings et. al.) demonstrated that cases who move are at increased risk of not completing TB treatment, and of becoming lost before treatment completion. Increased attention to this group of high-risk patients, including the implementation of the Interjurisdictional Referral Desk for tracking patient movement, has resulted in fewer cases with "moved" as a final outcome on the RVCT. The care of more of these patients is now being successfully transferred within California, and more patients are completing treatment in the destination jurisdiction. National efforts are now underway to address the issue of TB cases who move between states. CURE-TB, located in San Diego, is working with TB programs in Mexico and the U.S. to ensure that TB cases that move between the two countries, or are frequent border crossers, are able to successfully complete treatment.

By working closely with our partners in the local health jurisdictions, statewide organizations such as the California Tuberculosis Controllers Association, and the Centers for Disease Control and Prevention, the California Tuberculosis Control Branch is looking forward to continued progress in TB control. Our future efforts will focus on improving not only detection and treatment of active cases of tuberculosis, but also contact investigation and targeted testing activities throughout the state.

Citations

Ending neglect: the elimination of tuberculosis in the United States. Lawrence Geiter, editor. Committee on the Elimination of Tuberculosis in the United States, Division of Health Promotion and Disease Prevention, Institute of Medicine; 2000.

Cummings KC, Mohle-Boetani J, Royce SE, Chin DP. Movement of tuberculosis patients and the failure to complete antituberculosis treatment. Am J Respir Crit Care Med 1998.157:1249-52.